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Deer Repellents for Reforestation Plantings

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Deer have long been a problem for gardeners and homeowners. Many "home remedies" have been tried such as human hair and urine, sweaty socks, Irish Spring soap, blood meal, composted municipal sewage, ground jalapeno peppers, moth balls, and even coyote urine and lion feces. All have limitations relating to long term effectiveness, persistence, availability, cost, and ease of application. Most home remedies need to be reapplied after rain, to protect new growth, and deer eventually get used to the smell or taste. In general, once deer start feeding in an area, the only long term, 100% effective solution (other than eradication) is a fence.

Browsing by white tailed deer has been a growing problem for Wisconsin landowners planting seedlings for reforestation purposes. Last year, the state nurseries shipped over seventeen million seedlings, over 80%, of which are subject to browsing. Heavy browsing on white pine, white cedar, and hemlock has discouraged many landowners from planting these species. In some locations, deer have also begun to eat jack pine, red pine, red oak, aspen, basswood, and white ash making successful planting that much more difficult.

Browsing damage in the north is heaviest in late winter when snow cover is melting and deer begin to move around. Anything with green needles seems to attract attention. Further south, browsing on hardwoods is common. Local populations which, have become accustomed to eating a particular plant species generally are responsible for heavy losses. In addition, eating habits learned in one generation seem to be passed on, so certain plants continue to be eaten year after year until they are gone or have grown beyond the reach of the deer.

Unlike landscape plantings, reforestation covers many acres with thousands of small trees. Severe browsing damage can occur from only a bite or two in one visit. Protecting that many seedlings for several years in a row is much more difficult than a garden of less than an acre. Until recently, the only options available were bud capping, stapling a piece of paper over the terminal bud, or tree shelters. Both options, while effective, were expensive and difficult to apply.

Ideally, repellents for use on reforestation plantings need to be relatively inexpensive, be easily applied, can resist weathering, and generally discourage deer over a relatively long period of time. In an attempt to meet this demand, a number of commercial products have become available. They are based on materials that will repel pests based on smell, taste, or a combination of the two. Unlike most home remedies, large quantities can be purchased and they can be readily applied. In addition, some products can remain effective over winter from a single application.

Study Area

A test of a number of products (all liquids applied as a spray) was conducted on the Governor Knowles State Forest (T39N, R9W, Section 9) in the fall of 2003. The site selected was relatively level, had sandy soil, and had been clear-cut several years previously. Jack pine had been hand planted in scalps in 2002 but failed primarily because of deer browsing. Replanting to jack pine was done in the spring of 2003 in existing scalps. Some seedlings from the initial planting remained on the site in the fall of 2003. Deer were observed on the site prior to application and numerous tracks and droppings indicated a common presence. Browsing was observed during application on some of the jack pine seedlings, burr oak stump sprouts, and other woody materials on the site.

Methods and Materials:

Evaluations for existing browse damage and application of all repellents was done on November 3, 2003 by Shane Weber, Jim Varro, Mike Wallis, and Gordy Christians. Weather that day was cloudy, windy, 30 degrees and light snow began falling at noon. One row was selected for each product and every third tree within the row was treated with the product. At least 35 seedlings were treated with each product. All trees in the row were evaluated for browsing damage on a scale of 0 to 3. 0) had no browsing, 1) some buds were still present, 2) all or most buds were gone, 3) was a dead tree. Two untreated rows were left between treated rows to avoid having overlap repellent effects on adjacent trees. One untreated control row was also evaluated. All trees (both treated and untreated) in the test rows and the control were again evaluated for browsing damage on May 18 2004. Deer were again sighted in the area, and recent tracks and droppings were abundant.

The May browse reading showed that approximately 14% of the control row remained untouched.

DEER REPELLENT PROJECT FOR USE ON CONIFERS OVER WINTER:**List of materials**

Product name	Unit	Cost/Unit	Active Ingredient	EPA Registration Number	Mode of Action	Percent of Unbrowsed Seedlings
Deer Off	Gallon	\$101.50	Putrescent whole egg solids, Capsaicin, garlic	67356-1	Conc. Lasts 3 months, www.havahart.com , 1 gallon makes 8 gallons of mix	25.90%
Tree Guard	2.5 Gal	\$18.99/ qu \$95.00 / gallon	Bitrex (Denatonium benzoate)	6676-1	Liquid Season long protection, Beaker Underwood Inc.	17.90%
Plantskydd	2.2 lbs	\$38.50	Dried blood 99.84%, Veg oil	Exempt from FI FRA	Soluble Powder-400-600 plants-6 months over winter, or premixed, www.treeworld.com , 2.2 lbs per 2 gallons	29.00%
Thiram	Gallon	\$47.00	Thiram 42S 42%	400-434-7501	must use with a spreader sticker (plyac), 2qts per 2 gallons mix	18.80%
Hinder	gallon	\$37.99	Ammonium soaps of higher fatty acids 15%	400-383	liquid, 3-5 gallons in 100 gallons per acre for ground spray	21.70%

Analysis and Discussion:

All untreated as well as treated seedlings within the test rows were evaluated for browsing and were included in the calculations. For this reason, the percent gain shown does not reflect the true level of protection provided to seedlings that actually received treatment only the relative effectiveness of each product.

All products appeared to have some positive repellent effect compared to the control row. The "smell repellents" Deer Off, Plantskydd, and Hinder appear to be more effective than the "taste repellents" Tree Guard and Thiram. This tendency may be the result of the design of the project. Deer need to actually bite a seedling for a "taste repellent" to be effective. The small seedling size of the jack pine needed only one bites-worth of material removed to be read as "heavily browsed" (#2). Once this was removed there was little left for further browsing and any repellent gain would be lost. Also, the untreated seedlings around those treated with a "taste repellent" would do nothing to discourage feeding in that area. Treating larger size seedlings or all of the seedlings in an area may increase the level of protection from "taste repellents" because it brings the memory of the bad taste into play. "Smell repellents" on the other hand, would tend to stop the deer from taking that first bite and may have helped to protect untreated seedlings nearby.

Conclusion:

Application of commercially prepared deer repellents is potentially a solution to localized heavy browsing in reforestation plantations, especially for protection of small seedlings during dormancy. Both "smell" and "taste" repellents can be effective depending on the situation. In general, "smell repellents" are less persistent especially in wet and warm conditions than "taste repellents" and need to be reapplied more often to remain effective. Application costs using sprayers is comparable to applying any pesticide and can use the same equipment. Further tests are planned to help to refine effectiveness of spray applied repellents and evaluate new products.

Note:

State statute and DATCAP have ruled that repellents are considered pesticides. As such, applicators for hire need to be certified and licensed. EPA requires registration of repellents under FIFRA. In all cases label instructions should be followed. Mention of repellent or other commercial products in this article does not constitute endorsement.